

LAND RECLAMATION

by

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ABSTRACT

Environmental quality control has become a new development in the ever increasing complex of governmental and public interest in our living and the surroundings in which we live. It is having its impact on all industry, but major attention is being directed to the extractive and mining industries. The mineral industry also faces the challenging problem of meeting the needs of a tremendous industrial expansion which will require wise use of all of our resources, including land, water, mineral fuels and industrial minerals. To meet this challenge, there must be a better understanding of the economic and social aspects of the expanding demand for minerals and fuels and the effects of such accelerated demand on the environment. Remarkable progress has been made with respect to the problem of reclamation, but environmental science must keep pace with the changing times and advancing technology. Equipment and methods must be devised to discover and win deeper marginal reserves while maintaining an economic cost and diligently pursuing the problems of environmental pollution and the return of the mined land to its highest possible use. A better understanding of all the problems involved on the part of all regulating agencies and the mineral industry will greatly enhance the success of meeting the demands of the industrial expansion and alleviating the results of mining upon our environment.

LAND RECLAMATION

The quality of our environment, whether it be in air, land or other aspects of the ecology has become a topic of more general discussion by more people, in more places than any other topic today. "Environmental Quality Control" has become a new development in the ever increasing complex of governmental and public interest in our living and other surroundings in which we live. This growing public consciousness of environmental quality is having its impact on all industry but major attention is being directed to the extractive and mining industries.

Many years ago the mining industry was close to an invisible one to the general public. Mining was carried on in relatively remote

areas and the area affected was small in relation to population. Today, while not quite a suburban industry, mining is being moved constantly closer to major communities and their areas of interest. The increase in affluence and leisure time have exposed mining operations to the critical view of vacationers, home owners, sportsmen, conservationists and thousands of air travelers who have been increasingly critical of mining operations, particularly surface mining.

In addition to the serious problem of environmental quality facing the mineral industry today there is the challenging problem of meeting the needs of a tremendous industrial expansion. To meet the demands wise use will have to be made of all of our resources, including land, water, mineral fuels and industrial minerals. Mining of mineral resources will have to accelerate, more exploration will have to be done, and more progress made in mining technology concerning methods, equipment, recovery and production.

To meet this challenge the minerals industry must somehow extend its resource base. Additional sources of minerals that thus far have remained untapped must be discovered. More efficient mining methods must be developed to make low-grade deposits workable. Technology must be developed so that marginal resources can be made useful, processing techniques can be improved to increase recovery of mineral values inherent in mineral deposits, and mineral values may be recovered from waste. All of these tasks must be accomplished economically and in a manner that will minimize contamination of our environment.

America's resources have made her great. Mankind possesses no material treasures, no material wealth, except those derived from the earth itself. All of the accumulated wealth of the world owes its existence fundamentally to the progress of two great industries, mining and farming. Without them there is nothing. These activities form the indispensable physical base from which all other goods are produced. Each bushel of grain, each board foot of lumber, and each pound of iron, copper, lead or zinc fixes the base upon which other activities such as manufacturing, transportation, education, recreation and national defense, rest. These natural resources -- food, fiber, and minerals and the industries upon which they are based, are the only ones that produce new wealth. All other activities, although essential and important, are engaged in the refining, finishing, shaping or modification of these basic three. Two of these, food and fiber, are renewable. What is used can be replaced by natural growth of crops or trees. The third, minerals, is non-renewable and, once used, cannot be replaced unless recycled back into industry through the use of scrap.

Few people have any conception of the extent to which they are indebted to the mining and farming industries. I am afraid that the picture the public has in its mind of the mining industry is one of

companies which dig holes, strip vegetation, ruin scenery, pollute air and water and get rich quick, all with a minimum of effort and no risk at all. Believe me, this is certainly an erroneous picture.

Although the majority of operators in the minerals industry today recognize that more attention and work must be devoted to environmental problems relating to mining, the problem of damage to our environment by mining has been over-emphasized and magnified. Certain parts of the active mining operations which are exposed to public view prior to reclamation give the impression that the damage to the land is more wide spread and permanent than it actually is.

There are many other important land problems which have been neglected and observed while attention has been focused on surface mining.

According to the publication, "Surface Mining and Our Environment," issued in June, 1967, by the Department of the Interior, which proposed Federal legislation to control surface mining, 3.2 million acres of land have been disturbed by surface mining since mining began. This figure includes mining for all minerals and fuel and amounts to fourteen one-hundredths of one percent of the land area of the United States. The report states that two million acres need some form of reclamation. Actually the greater share of the reclamation already accomplished has been done by the coal and phosphate rock industries, and much of it on a voluntary basis.

Every year in the United States two million acres are gobbled up by subdivisions, super highways, shopping centers, airports and industrial sites. Land converted to such uses are commandeering highly productive Agricultural land which will never again be productive. In most cases, land used for mining is marginal or sub-marginal land which has been and will be restored to forest, grazing lands, orchards, wildlife habitat, and recreational areas. According to the Department of Agriculture there will be a greater need for forest, pasture and recreational land in 1980 than for cultivatable land.

During some years in the United States more land is covered with black top for parking lots and permanently ruined for any form of life than is temporarily withdrawn from our land for mining purposes.

In addition, consider the infinitely greater damage to our land by bad cropping practices and bad range practices -- insidious, silent, unexposed to public view. A Department of Agriculture report states that 1,448,000,000 acres of land in private agricultural hands, 877,000,000 acres are in need of partial or complete protective and remedial practices. Again to put things in proper perspective, the Department of Agriculture, in another report issued in May 1962, entitled "A Land and Water Resources Policy Guide," states that there are in the United States 640,000,000 acres of land suitable for regular cultivation and that by 1980 we will need 407,000,000 acres for

cultivated crops, leaving a surplus at that time of 233,000,000 acres. Contrary to propaganda, we are just not going to run out of cultivatable land due to surface mining in the United States.

The 140,000 annual acres of marginal agricultural land from which we get most of our sand, gravel, limestone, iron, copper, phosphate rock, lead, gold, molybdenum and other minerals and about one third of our coal have certainly been given much more dramatic attention for the deleterious effects of mining than the gain the general public gets from the utilization and development of these great natural resources. Not enough concern will be shown over the two million acres of prime agricultural land that is permanently being lost each year to megapolis. Nor is enough attention given to the 877,000,000 acres of land in the United States that need remedial treatment.

Since 1918, when the first tree was planted by the Indiana Coal industry, remarkable progress has been made in reclamation work. Years prior to the enactment of legislation regulating the surface mining of coal by any states, voluntary reclamation work was carried on by responsible companies. Later, these companies formed Reclamation Associations in a number of states to promote more voluntary reclamation. In 1963 the Mined Land Conservation Conference was organized for the purpose of encouraging reclamation on a voluntary basis. These efforts, along with the efforts of other industry associations and organizations, on both the national and state level, have resulted in a definite change in attitude on the part of the surface mining industry concerning reclamation. Today, with but few exceptions, operators are aware of the need to reclaim affected areas for some productive use and are making reclamation a component part of their over-all mining operations.

The Mined Land Conservation Conference, which I served as chairman from its inception until 1968, reflects the modern coal industry's awareness of its broad responsibilities to the society it serves. An affiliate organization of the National Coal Association, it has devoted its energies to advancing the restoration of mined lands to productive use. In addition to promulgating a voluntary code of standards for the industry to follow, it has formed a technical committee composed of foresters, agronomists, engineers, and soil experts whose services are available to all segments of the industry to assist in conservation, soil and water problems in connection with mined lands.

Reclamation is still a relatively new science. The overburden resulting from surface mining operations does not resemble any type of soil that has been classified or studied by the agricultural experiment stations. The manner and extent of grading and the species of plants and trees the mined land would support had to be determined by experimentation. Individual companies, industry associations, state and federal agencies, Universities and colleges, and other groups have all played an important part in developing pertinent information about the reclamation of land affected by surface mining. This information has

all been made available to the industry as well as the assistance of members of technical committees of various industry associations who are all experienced reclamation specialists.

Although the knowledge gained by means of years of experience and research has made it possible today for the industry to do a more effective job of reclamation, nevertheless, constant and increasing effort must be made, not only by the mining industry, but all industry to clear up the air, clean up our water and see that mined land is reclaimed and restored to its highest possible use. All of these must be accomplished within the bounds of reasonable economics so that the constantly increasing demand for minerals and fuels will be met. Environmental science must keep pace with the changing times and advancing technology. What were outstanding conservation programs 40 years ago, or even 10 years ago, are not acceptable by today's standards. Even though the surface coal industry has constantly upgraded its conservation practice and taken great pride in its achievements, further progress is going to have to be made.

To accomplish this goal there is a great need on the part of governmental agencies, the mineral industry and the general public for a better understanding of the economic and social aspects of the expanding demand for minerals and fuels and the effects of such accelerated demand on the environment.

Much time and thought has been expended on how to provide food and fiber for future masses, but not enough attention has been paid to where the minerals and fuels will come from and how it will affect our environment. Few people realize that if, as is often postulated, we try to bring the world up to our standard of living our known reserves of lead, zinc, and copper would last about five years. The world supply of petroleum would be exhausted in four or five years, and every year we would have to discover and exhaust twice as much iron ore as is contained in the Cerro Bolivar iron deposit in Venezuela, the greatest iron ore find of the Twentieth Century. Many other minerals would be in equally short supply. While it is unlikely that we will soon see the rest of the world attain our standard of living, the demand for minerals is growing at a phenomenal rate.

Geologists and geophysicists are finding it increasingly challenging to discover the minerals and fuels to maintain our necessary reserve ratio. Discoveries at substantial depth are infinitely more difficult and costly to discover and to develop than are our present reserves. We are going to run out of mineral reserves before we run out of food and fiber, and equipment and methods including reclamation methods must be developed to make it possible to recover these deeper reserves within economic limitations. More careful consideration is going to have to be given to legislation that will encourage and promote the production of marginal reserves.

Concurrently, the mineral industry must diligently pursue the problems of environmental quality control and the return of affected land to its highest possible use. To achieve the results that are going to be demanded in the future, the mineral industry must continue research to develop practices and methods that will enable the industry to do reclamation more effectively and economically in accordance with established requirements. The achievement of this end will require some compromising on the part of regulating agencies and the industry. For example, experience and research has shown that excessive grading causes compaction and best results are obtained on mined land on which a minimum of grading has been done. Many experts in the fields of forestry, silviculture and agronomy have given testimony in support of the validity of the situation. However, regardless of the facts established by research and experience, regulations continue to be formulated with more extensive grading requirements. As a result, even though it is contrary to proven good practices, the mineral industry must face the realization that more grading is going to have to be done and research will have to be carried on to find ways and methods of successfully planting graded land.

Equipment will be needed to enable operators to carry on reclamation work more effectively and economically. Unfortunately the progress made in the development of equipment used for the purpose of reclamation of land affected by surface mining of coal has not kept pace with the development of equipment used to produce the coal. The large capacity machines make it possible to recover coal seams at greater depths and pit widths making grading more difficult and costly. Currently, industry's answer to the grading problem has been larger and larger dozers equipped with blades of increased capacity. There is an urgent need for the manufacturers of equipment to devote more time and study to the development of various adoptions of draglines and tower excavators toward the accomplishment of greater yardage per hour without the disadvantage of compaction caused by bulldozing. The same ingenuity and engineering skill that has produced the production equipment in use today should develop equipment that will make it possible to carry on reclamation work more effectively at a low cost. Although there have been no major "break-throughs" as yet in the development of new equipment expressly designed for reclamation there has been a number of adaptations of equipment for specific earth moving applications. Two recent developments have to do with dozer blades and dragline buckets such as the Balderson Bowldozer blade and the Sauerman crescent type scraper dragline bucket.

The engineering aspects of reclaiming lands in mountainous terrain presents a different problem and is in need of far more attention. Unstable slopes create tremendous problems including sliding spoils and silted streams. Present thinking is often in the direction of prohibiting mining on areas having more than a certain degree of slope. This often results in the waste of valuable natural resources. Other solutions must be found such as the construction of silt dams and the development of equipment to prevent and alleviate these conditions.

It has not been my intent and purpose to take a defensive attitude in regard to the mineral industry, or to extol the industry, but rather to attempt to give a realistic picture of the situation facing the mining industry today with respect to our environment. As the result of the many years of experience I have had in my industry, it is my firm conviction that if the coal industry and the other mineral industries are going to be able to meet the demands of the projected industrial expansion they must not have a negative attitude. The problem of environmental quality control must be faced with the same spirit of ingenuity, determination and resourcefulness as were the problems of mechanization, transportation and production.

The mineral industry will need engineers capable of understanding both the economic and social aspects of the expanding demand for minerals and fuels and the effects of such accelerated demand on the environment. It will need men whose wisdom, courage and vision can counter nihilistic attacks and damaging and punitive legislation while simultaneously developing realistic programs to build a better environment. With this kind of people ways and means can be devised to produce the wealth of the world through the extraction of minerals and fuels, alleviate the results of mining upon our environment, and preserve and enhance those aesthetic values which are also important to man's well-being.

COMMENTS

QUESTION: Mr. Foresman, you pay some attention to a very critical problem and that is of mineral supply. A problem of mining coming closer and closer or, vice versa, urbanization coming closer and closer to mining or mining to the city. Do you have any comments about the problem of the mining industry and zoning authority and particularly, local zoning jurisdiction, and the difficulty of dealing with those jurisdictions when you need to look at a regional or national mineral supply.

REPLY: We don't have too much to do with zoning in the coal industry. I think the sand and gravel industry does have this problem; and has had it for quite some time. Personally, for our industry, we have been faced with this perhaps one or two times and of course this does pose quite a problem in the industry. Certainly if we are going to meet this industrial expansion we are going to have to have this encouragement through legislation that will enable the industry to recover these valuable reserves and it is going to take cooperation in the part of all agencies involved to enable the industry to produce the demand that is going to be expected of them.